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Serial No. 10/699,159

MAR 10 2008

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Appl. No. : 10/6990,159  
Applicant(s) : Daniel C. Conrad  
Filed : October 31, 2003  
T.C./A.U. : 1751  
Examiner : Amina S. Khan  
Docket No. : US20010201

I hereby certify that this correspondence is being mailed to the U. S. Patent and Trademark Office, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on the date indicated below.

Name : Eileen T. Mathews

Signature: 

Date : March 10, 2008

Mail Stop Amendment  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

**Declaration Under 37 § C.F.R. 1.131**

Dear Sir:

I, an inventor, hereby declare as follows:

1. I am an inventor of the subject matter that is claimed and for which a patent is sought on the invention as above mentioned. This utility application was filed on October 31, 2003.

2. In the Office Action dated October 9, 2007, the United States Patent and Trademark Office (USPTO) rejected claims 1, 2, 5, 6, 8-11, 79-89, 92 and 93 under section 103(a) as being unpatentable over Estes et al., US Publication No. (2002/0056164), filed on December 20, 2001 and published on May 16, 2002, in view of Radomyselski et al., US Publication No. (2005/0000897) filed on June 24, 2004, which claims priority to U.S. Provisional Application Nos. 60/483,154 and 60/483,290 filed on June 27, 2003.

3. The USPTO also rejected claims 3, 4, 7, 12, 13, 90, 91, 94, and 95 under section 103(a) as being unpatentable over Estes et al., US Publication No. (2002/0056164), and Radomyselski et al., US Publication No. (2005/0000897) in view of one or more of the tertiary references, Radomyselski et al. (2003/0226214), Berndt et al. (US 6,086,635), and Hallman (US 2003/0196277).

Serial No. 10/699,159

4. Claims 1, 2, 5, 6, 8-11, 79-89, 92 and 93 of Pending Application Serial No. 10/699,159 which were filed on October 31, 2003 are not obvious over Estes et al. (2002/0056164) in view of Radomyselski et al. (US 2005/0000897). Claims 3, 4, 7, 12, 13, 90, 91, 94, and 95 of Pending Application Serial No. 10/699,159 are not obvious over Estes et al. (2002/0056164) in view of Radomyselski et al. (US 2005/0000897) and at least one of tertiary references Radomyselski et al. (2003/0226214), Berndt et al. (US 6,086,635), and Hallman (US 2003/0196277).

5. This written document is a Declaration of prior invention to overcome the cited publication of Radomyselski et al. (US 2005/0000897). I, an Inventor of the subject matter of the rejected claims, hereby submit this declaration to overcome this reference. I performed certain acts described below.

#### **I. Showing of Facts Through Document Evidence**

6. Below are facts that show a conception of the invention on or before the June 24, 2004 filing date of Radomyselski et al. U.S. Utility Application No. 2005/0000897 and the June 27, 2003 filing dates of Radomyselski et al. US Provisional Application Nos. 60/483,154 and 60/483,290, coupled with due diligence from such conception to a subsequent actual reduction to practice or to the utility application filing date of October 31, 2003.

7. Exhibits A and B are submitted herewith. Exhibit A is a presentation entitled "Grail solvent Reclamation" which summarizes several ideas and findings pertaining to cross flow membrane filtration in laundering processes from testing of such filters during conducted December 6-14, 2001 and was work performed prior to the June 27, 2003 filing dates of U.S. Provisional Application Nos. 60/483,154 and 60/483,290.

8. Exhibit B is a presentation entitled "Update on the Current Status of the Fluid Reclamation Prototype" Exhibit B shows the relevant portions of a slide presentation to the project steering committee and which summarizes non-aqueous laundering and reclamation processes, cross flow membrane filtration equipment and test results conducted in December 2001, and prior to the June 27, 2003 filing dates of US Provisional Application Nos. 60/483,154 and 60/483,290.

#### **A. Facts establishing conception**

9. In general, the facts of Exhibits A and B are hereby incorporated by reference. Moreover, I present the following facts to establish a conception of the invention before the June 24, 2004 and June 27, 2003 filing dates.

Serial No. 10/699,159

(i) Conception

10. The basic inventive concept of the application is the various embodiments of an apparatus and method of non-aqueous laundering using a cross flow membrane filter.

11. The USPTO presents Radomyselski et al. as teaching a cross flow membrane filter which also meets the that required of Applicants' method. However, as explained in the contemporaneously filed Response to Final Office Action dated October 9, 2007, Applicants have conceived the idea before the filing dates of Radomyselski et al. Exhibit A shows the functioning of cross flow membrane filtration, the advantages and disadvantages of such membranes as a result of testing, and further testing to be conducted. Exhibit B provides a fluid reclamation schematic showing the two streams exiting the cross flow membrane filter, the permeate and the concentrate streams. Exhibit B also shows test results measuring the effectiveness of cross flow membrane filtration of various contaminants (e.g. olive oil, Zoryl UR, iron oxide, clay) in a non-aqueous fluid, for example, HFE, in prototype reclamation equipment.

(ii) Effective date of Radomyselski et al.

12. As indicated on the face of the Radomyselski et al. U.S. Publication No. (2005/0000897) issued on January 6, 2005, and has filing date of June 24, 2004, and which claims priority to U.S. Provisional Application Nos. 60/483,154 and 60/483,290 filed on June 27, 2003. Accordingly, the earliest date to overcome is June 27, 2003.

(iii) On or before the effective date of Radomyselski et al.

13. I allege that the acts relied upon to establish the date before June 27, 2003. The testing and the Exhibits A and B attached were generated prior to the filing date of June 27, 2003.

**B. Facts establishing reduction to practice**

14. In general, the facts of Exhibits A and B are hereby incorporated by reference. Moreover, I present the following facts to establish a reduction to practice.

(i) Actual reduction to practice

15. After conception of the invention prior to June 27, 2003, I tested or had various embodiments of the invention tested to establish its capacity to successfully perform its intended purpose. Exhibit A discusses the project "Grail" solvent reclamation and the various system considerations regarding, for example, the various types of contaminants, the process flow requirements for reclamation of non-aqueous fluids, and equipment specifications in laundering which we determined for the use of cross flow membrane filtration. Exhibit A also includes the

Serial No. 10/699,159

reclamation planning for February 14, 2002 and lists additional testing to be conducted. Exhibit B illustrates the schematic process flow of reclaiming non-aqueous fluid in a laundering apparatus, including the two streams which exit the membrane. Test results relating to flux rates and concentration of contaminants in the permeate were reported for the prototype unit. Additional testing for membrane materials are proposed prior to the June 27, 2003 date.

(ii) Constructive reduction to practice

16. I allege that the present application for a U.S. patent recites independent claims of the same invention disclosed in the utility application 10/699,159 filed on October 31, 2003.

17. Therefore, constructive reduction to practice was achieved on October 31, 2003.

C. Facts establishing reasonable diligence

18. I present the following facts to establish that there was reasonable diligence from before the June 24, 2004 and June 27, 2003 filing dates of Radomyselski et al. to the actual reduction to practice of Exhibit A or alternatively to the utility filing date.

19. As noted above, conception occurred before the June 24, 2004 and June 27, 2003 filing dates of Radomyselski et al. Moreover, actual reduction to practice occurred on or before October 31, 2003. I assert that there was reasonable diligence from conception to reduction to practice, either actual or constructive. Both Exhibits A and B show test results and also indicate additional testing for purposes of reclaiming non-aqueous fluids in an automated laundering apparatus. As Exhibits A and B show, I was cognizant of the need to pursue patent applications to protect the invention. The inventors timely filed a utility patent application on October 31, 2003. The selection of filtration devices and media, the experiments conducted and the actual filing of a patent application indicate a reasonable diligence period from on or before the Radomyselski et al. filing dates.

20. Alternatively, the time period taken for the completion of the application constitutes reasonable diligence. During this time period, I and/or our representative worked reasonably hard and expeditiously to prepare, execute and file a patent application in the United States Patent Office. Accordingly, there was reasonable diligence from on or before the Radomyselski et al. filing date to the filing of the application of the present invention.

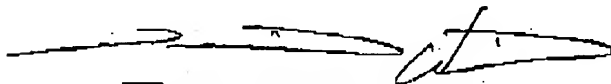
II. Allegations and other Statements

21. I allege that the acts relied upon to establish the date on or before Radomyselski et al. were carried out in the United States.

Serial No. 10/699,159

**III. Signature and Declaration in Lieu of Oath Under 37 CFR 1.68**

22. I hereby declare that the statements made of my own knowledge are true and that all statements made on information and belief are believed to be true. I acknowledge that willful false statements and the like are punishable by fine or imprisonment, or both (18 U.S.C. 1001) and may jeopardize the validity of the application or patent issuing thereon.

Tremitchell Wright3/10/08  
Date

## EXHIBIT A

# Grail Solvent reclamation

Testing week 6-14 December, 2001



# Membrane general remarks

## Advantages

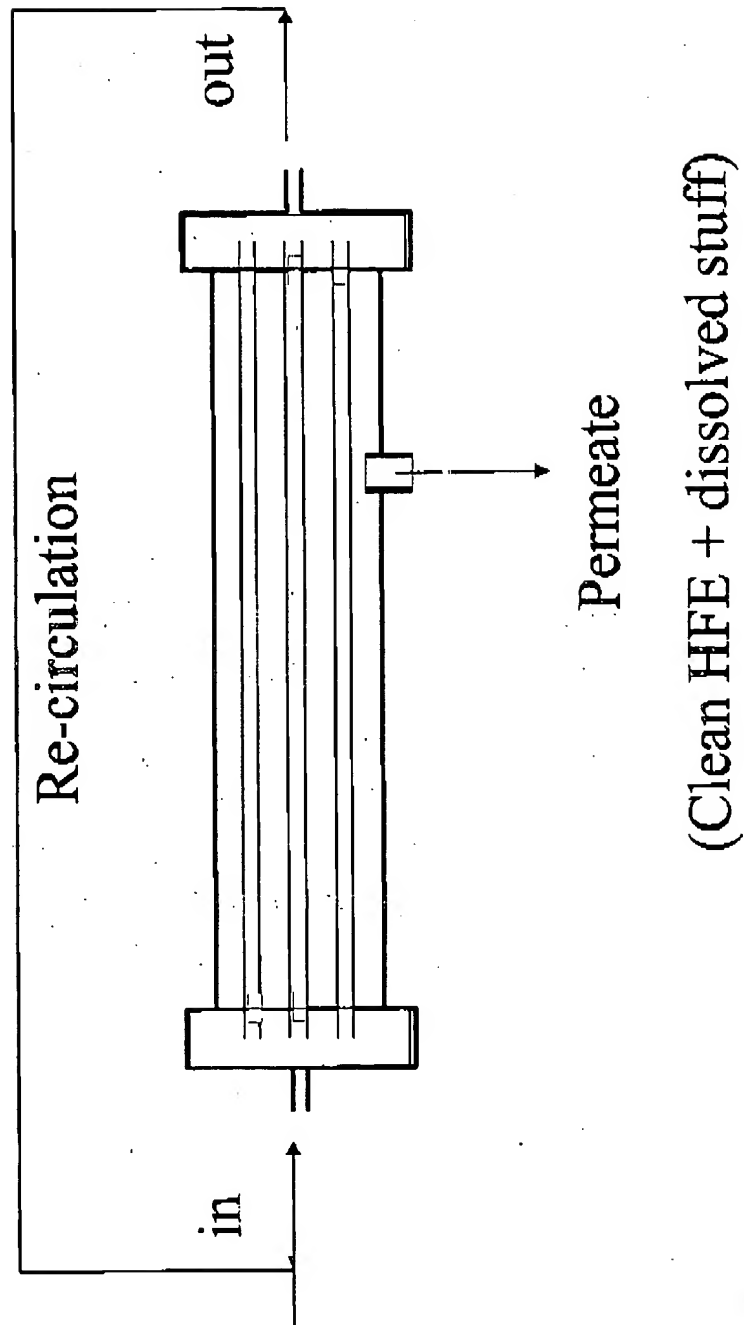
- Low energy use
- Efficient separation
- Mild process conditions

## Disadvantages

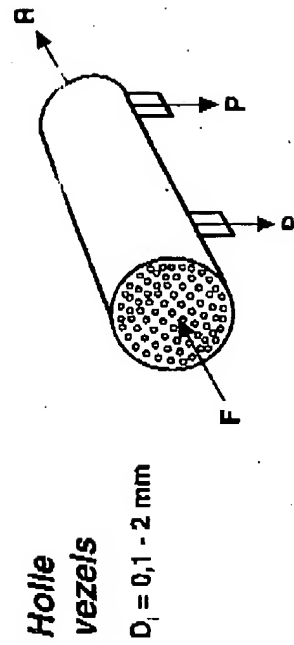
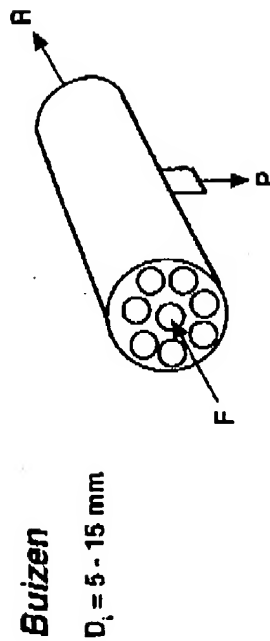
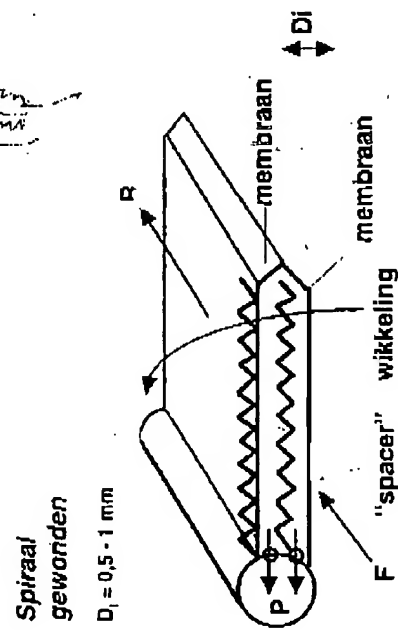
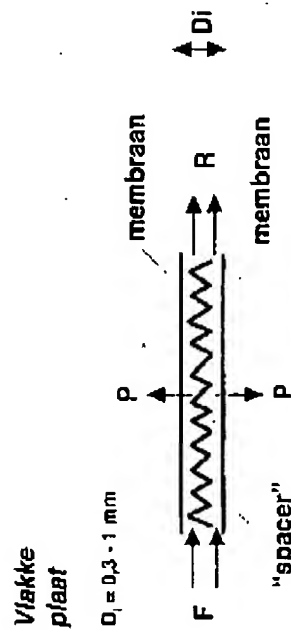
- Soiling problems
- Membrane life time
- New technology



# Cross-Flow Membrane



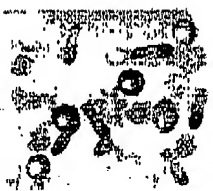
# Different membrane modules



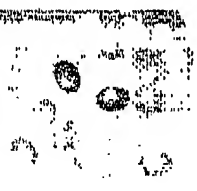
# Membrane Separation Cut-off's



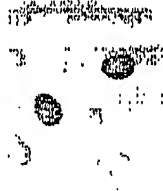
Microfiltration  
>0.5 µm  
>500,000 Da



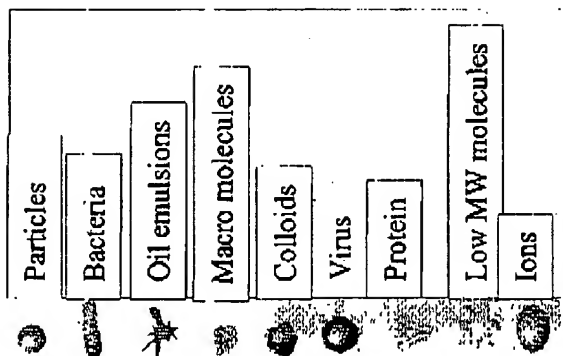
Ultrafiltration  
0.1 - 0.01 µm  
1,000 - 500,000 Da



Nanofiltration  
0.01 - 0.001 µm  
100 - 1,000 Da



Reverse osmosis  
<0.001 µm  
<100 Da  
Dissolved molecules  
Molecular weight



# Membrane unit costs

<u>Part</u>	<u>% of total investment</u>
Pumps	30
Membrane	20
Module (housing)	10
Frame/tubing/valves	20
Control	15
Others	5



# Membranes: soiling

## Reasons:

- accumulation of solids
- surpassing solubility ranges
- adsorption (largely affected by charge of membrane)
- bacteria growth

## Effects:

- decreasing flux
- increasing pressure drop
- Plugging



# Membranes: soiling

## Remedies

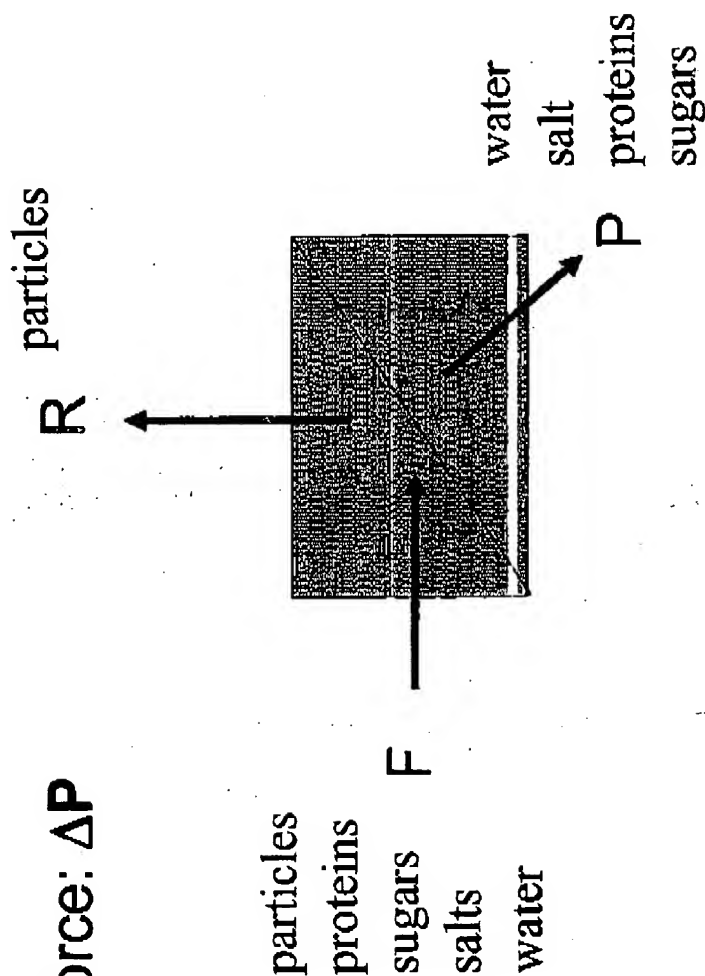
- pre-filtration
- lowering concentrations
- back flushing
- high flow rates
- chemical cleaning



# Membrane separations

## Micro-filtration

Driving force:  $\Delta P$



Pore size: 100  $\mu\text{m}$ - 100 nm



# Membrane separations

## Micro-filtration

- Separates: particles, some bacteria, micells (?)
- Clean water flux:  $0.5 - 2 \text{ m}^3 \text{ m}^{-2} \text{ h}^{-2}$
- Operational flux:  $0.03 - 0.3 \text{ m}^3 \text{ m}^{-2} \text{ h}^{-2}$
- Operational pressure: 1-3 bars

- Applications  
Cold sterilisation (Pharmaceutical)  
Beverages (Wine, beer, fruit juice)  
Drinking water

- Remarks  
Back flushing is important



# Reclamation prototype learnings

- CFM cleans out, fats, particulates and water, passes surfactant and colorant
- Still needs redesign, heat jacket burned down during first experiments (volume ?).
- Diameter of the lines and valves should be increased for the concentrate loop to prevent plugging.
- Doubts about the capacity of the condenser, need more work on this.



# Reclamation planning till 021402

- ◆ Test Functionality of Silica Adsorbers
- ◆ Distillation Unit should be working
- ◆ Connected Liquid/Vapor Reclamation
  - Vapor System Built
  - Reposition Silica and Carbon Adsorbers
  - Condenser Efficiency
  - Investigate Pumps
- Reconsider Diameter and Necessity of Lines/Valves
- Go from gauges to sensors
- Re-size carbon bed (residence time needed)



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# Reclamation planning till 021402 (cont)

- Co-solvent Thoughtmap
- Surfactant Recovery Thoughtmap
- Plan for next generation prototype
- Membrane, the next generation  
Smaller and different types?  
Cleaning strategy for the membrane



## EXHIBIT B

# Update on the Current Status of the Fluid Reclamation Prototype

### Team Members:

Hank Reinhoudt

Mick Goedhart

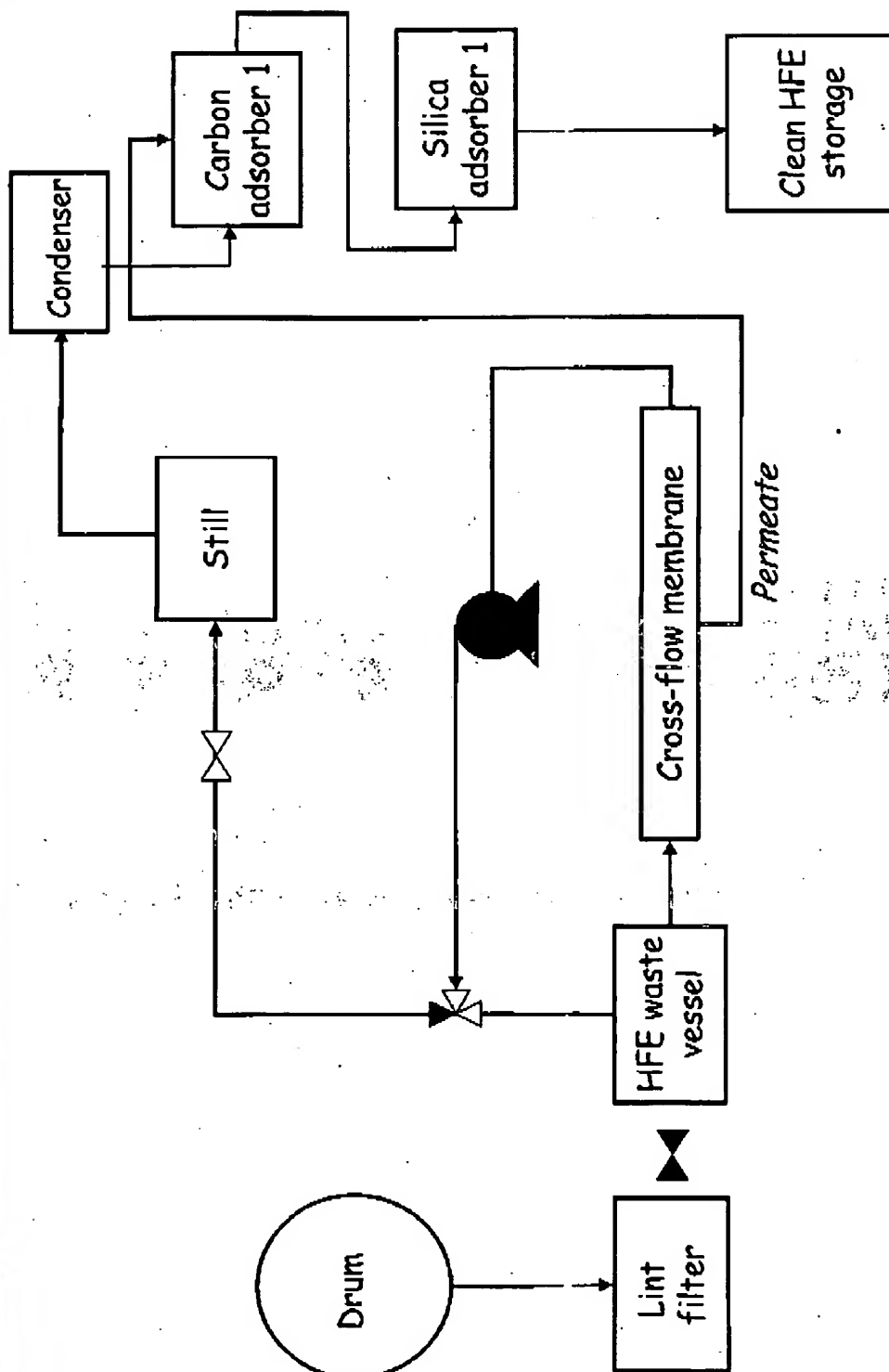
Vicki Wyatt-Smith

Joel Luckman

1



# Fluid Reclamation Scheme for December



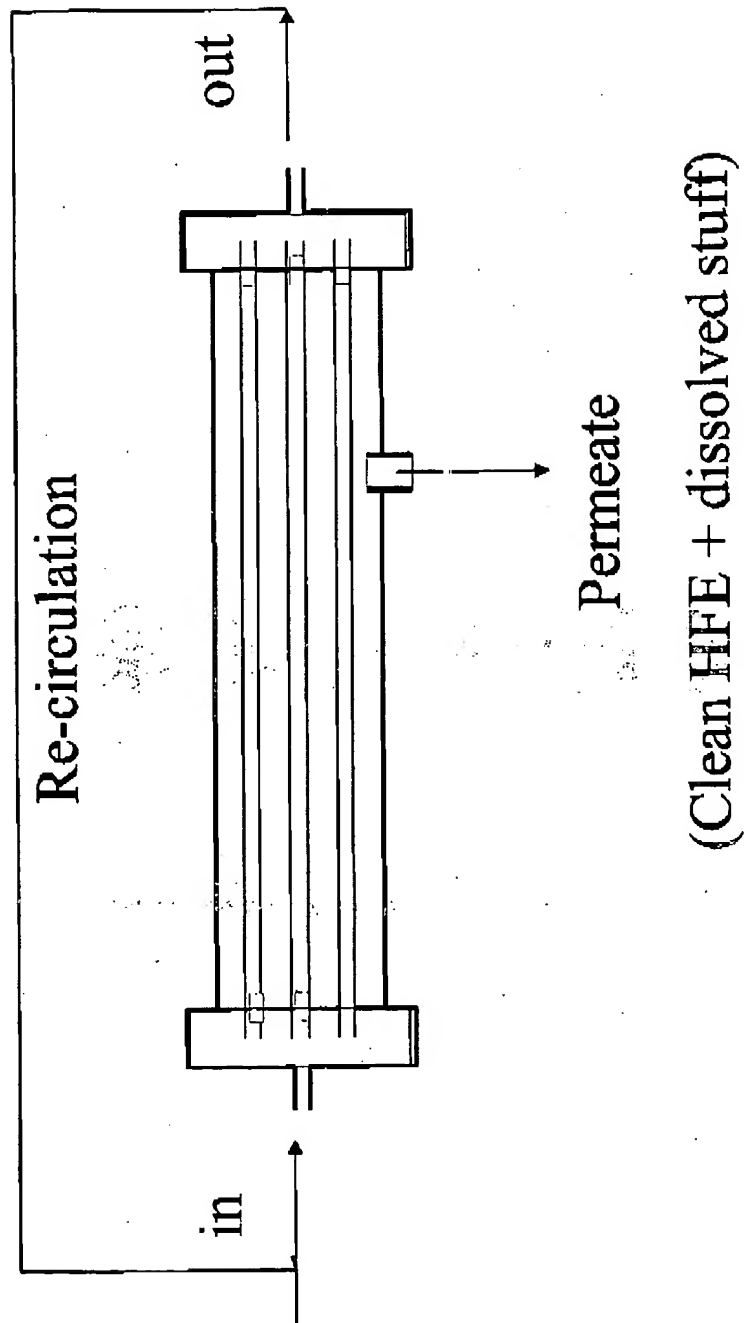


## **Crossflow Membrane**

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- ◆ ***Will be used to concentrate the soil from the wash into a smaller volume of HFE***
- ◆ ***Effectively decreasing the size of the distillation unit needed***
- ◆ ***Making process more energy-efficient***
- ◆ ***Two streams exit membrane***
- ◆ ***Concentrate - Contains majority of soil in small HFE volume***
- ◆ ***Permeate - Contains majority of HFE with minimal soil***
- ◆ ***Will separate particulate matter and micellar structures***
- ◆ ***Components that are soluble with HFE will pass***

# Cross-Flow Membrane





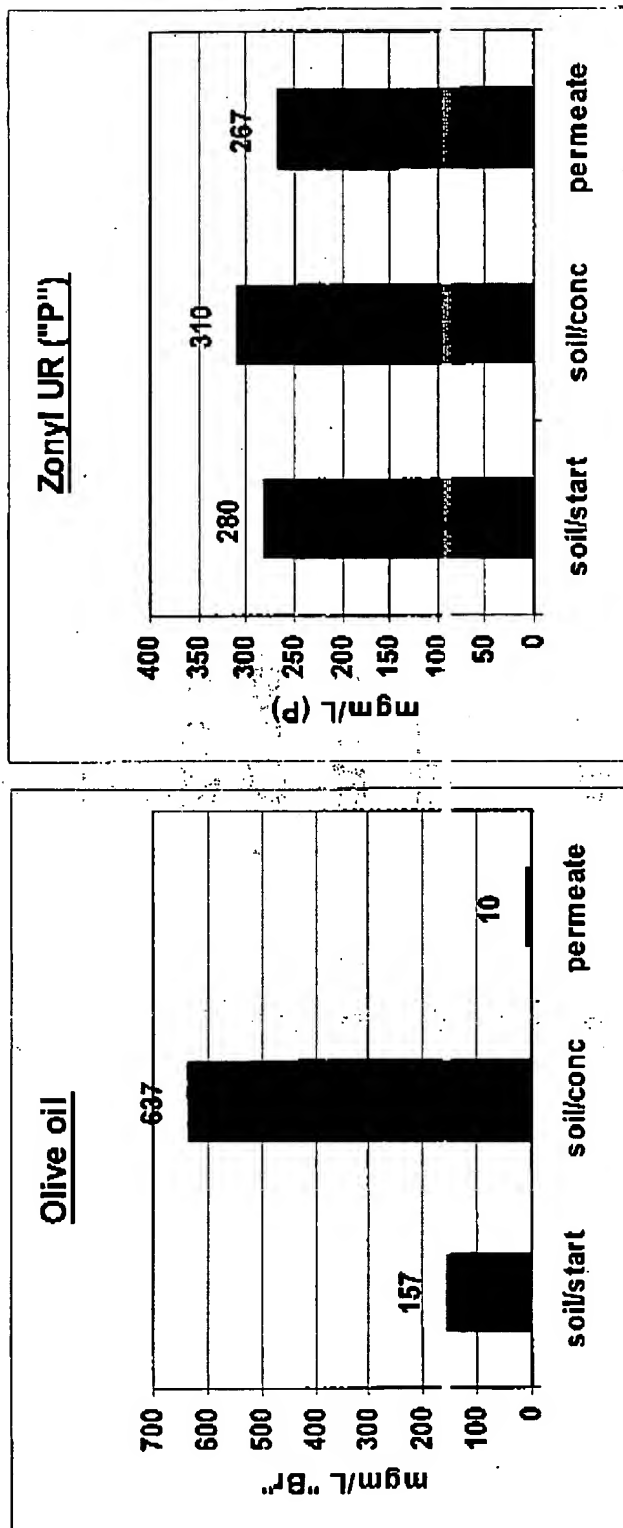
## Cross-flow Tests

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- ◆ *Initial Testing in Vlaardingen have shown Permeation of HFE in Membrane is Efficient and Fast*
- ◆ *For HFE , the permeation rate was 150 kg/h*
  - ◆ *Six times faster than water*
- ◆ *130 kg/h for a 0.5 % water + Zonyl + HFE solution*
  - ◆ *Zonyl passes through membrane - 95 %*
- ◆ *Waste stream may be processed in as little as 10 minutes*
- ◆ *Ceramic membranes may even provide better results*
- ◆ *Membrane selectivity will be completed at a later date*

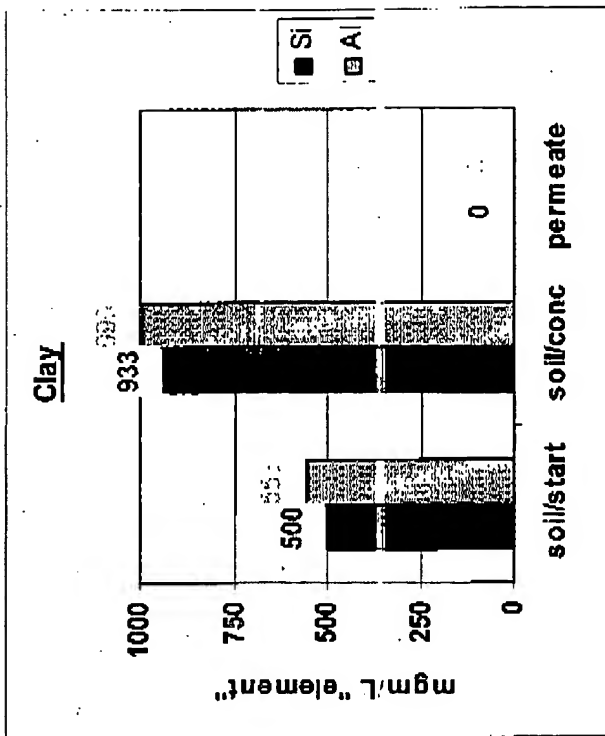
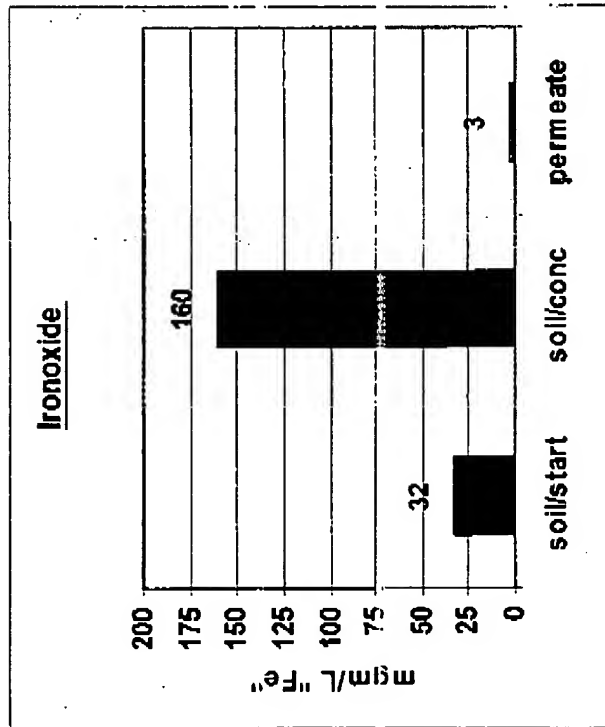


# Mick's membrane test: analysis



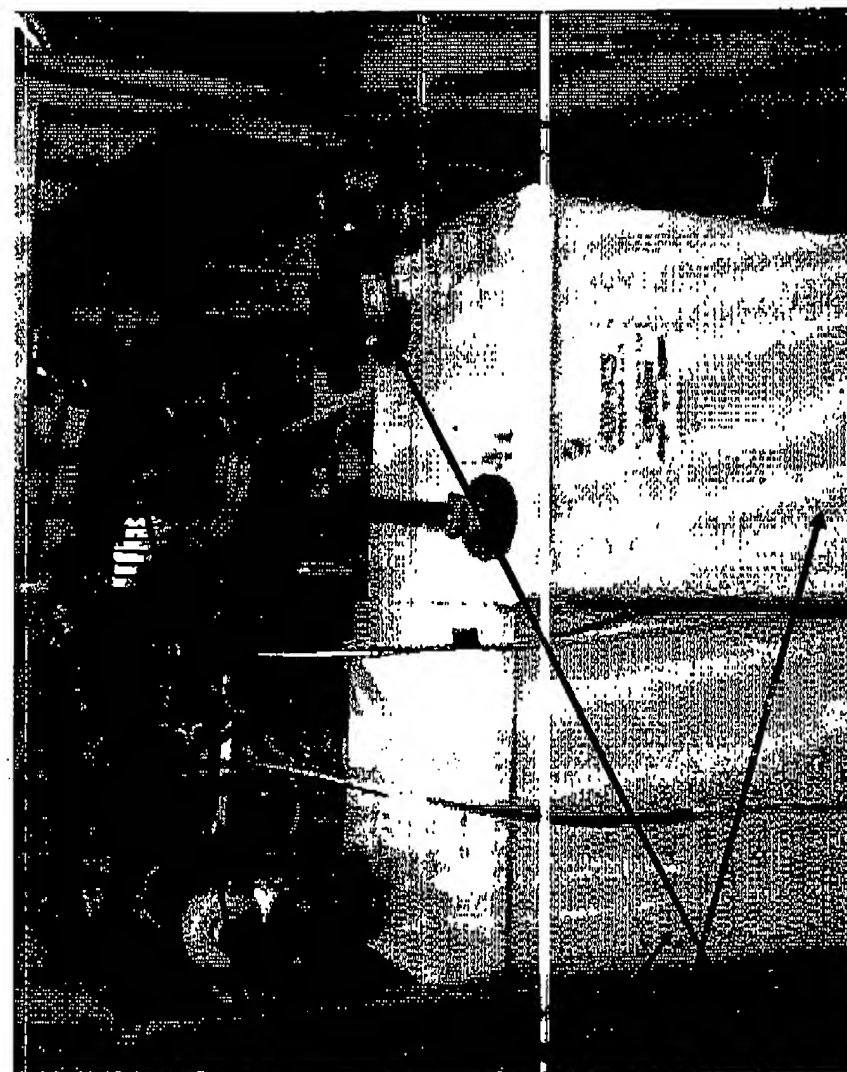


# Mick's membrane test: analysis





# Front View of the Prototype



Silica Adsorption  
Bed

Inlet to Cross-Flow  
Membrane

Clean Storage Tank

Waste Storage  
Tank

Metering Valve to  
Control Flowrate